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## Abstract

Australian householders respond to bushfire in diverse and complex ways according to their circumstances and characteristics. They tend not to simply make a binary decision to evacuate from or remain at their property, or simply to 'wait and see' what happens before they decide. Seven self-evacuation archetypes displaying universally recognisable, fundamentally human characteristics were identified through cluster and discriminant function analysis of data from 457 householders who had recently experienced a bushfire. These seven archetypes characterise the diverse attitudes and behaviour of typical groupings of householders faced with making a protective decision during a bushfire. The archetypes comprise those who deny a threat exists (Threat Denier), who do not believe that they are responsible for themselves (Responsibility Denier) or are unable to take responsibility for their safe evacuation (Dependent Evacuator). They include those who are determined to safely evacuate (Considered Evacuator), those who look to advice and guidance from their community (Community Guided) and those who make considerable efforts to remain but are concerned they lack the experience to do so successfully (Worried Waverers). Some, who are experienced with bushfire, self-reliant and well prepared are committed to remaining (Experienced Independents) but in unfavourable circumstances may evacuate. Bushfire safety policy and programs should not treat these householders as simply stereotypical 'evacuators' or 'remainers' but accommodate the diversity of these archetypes to effectively meet their educational and engagement needs.

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# Self-Evacuation Archetypes in Australian Bushfire

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## **Abstract**

Australian householders respond to bushfire in diverse and complex ways according to their circumstances and characteristics. They tend not to simply make a binary decision to evacuate from or remain at their property, or simply to ‘wait and see’ what happens before they decide. Seven self-evacuation archetypes displaying universally recognisable, fundamentally human characteristics were identified through cluster and discriminant function analysis of data from 457 householders who had recently experienced a bushfire. These seven archetypes characterise the diverse attitudes and behaviour of typical groupings of householders faced with making a protective decision during a bushfire. The archetypes comprise those who deny a threat exists (Threat Denier), who do not believe that they are responsible for themselves (Responsibility Denier) or are unable to take responsibility for their safe evacuation (Dependent Evacuator). They include those who are determined to safely evacuate (Considered Evacuator), those who look to advice and guidance from their community (Community Guided) and those who make considerable efforts to remain but are concerned they lack the experience to do so successfully (Worried Waverers). Some, who are experienced with bushfire, self-reliant and well prepared are committed to remaining (Experienced Independents) but in unfavourable circumstances may evacuate. Bushfire safety policy and programs should not treat these householders as simply stereotypical ‘evacuators’ or ‘remainers’ but accommodate the diversity of these archetypes to effectively meet their educational and engagement needs.

**Additional Keywords:** wildfire, hazard, personal safety, public policy

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## 1. Introduction

Threat from a bushfire (or wildfire) results in a protective response from those who feel they are exposed to it. In Australia, householders may choose to stay and defend their property or evacuate, while some wait and see how circumstances develop before they decide on their actions [1-3]. This paper discusses householder characteristics that influence their protective decisions during a bushfire which is based on the findings of research undertaken for a PhD study of householder decision-making in Australian bushfire identifying factors that influence self-evacuation.

It explores how and why householders reach their protective decisions by establishing the characteristics of different archetypal self-evacuators. Self-evacuation archetypes can provide insights into factors that influence the protective decisions of ‘typical’ groupings of householders (rather than specific individuals), suggest ways they reach those decisions, and provide some guidance in the improvement and development of bushfire safety programs. The existence of archetypal groups suggests that information, advice, and warnings provided by the emergency authorities before and during a bushfire are received and processed by a range of householder types, not by a simple dualism of evacuators or remainers. These archetypes do not portray individuals but represent the attitudes, behaviours and actions of typical groups of householders during a bushfire. Individuals may however, reflect many of the characteristics of archetypal groups and the archetypes should to some extent ‘ring true’. They can be used as a tool to understand the attitudes and behaviours of these typical groups of householders toward bushfire threat.

The paper begins by reviewing changes in Australian bushfire safety policy reflected in the adoption of the ‘Prepare. Act. Survive’ (PAS) policy and many householders’ reluctance to accept and implement major elements of this policy, partly because it discounted conventional wisdom reflected in the previous ‘Prepare stay and defend or leave early’ (PSDLE) policy. The paper proposes the concept of archetypes as a basis for understanding the variety of householder protective responses during bushfire and uses cluster and discriminant function analysis to identify seven archetypal groups of self-evacuators.

The paper presents the results of the analysis, highlights the diverse perceptions and behaviour of the householders who comprise these groups and elaborates on their characteristics by examining the similarities and differences between them.

It discusses how detailed insight into the varied perceptions and motivations of the archetypal groups can assist in developing and targeting bushfire safety policy to increase its relevance and effectiveness.

## **2. Australian Bushfire Safety Policy**

The tragic fatalities and losses of the 2009 ‘Black Saturday’ bushfires in Victoria, Australia, and the subsequent Victorian Bushfires Royal Commission (VBRC) [4] produced changes in bushfire safety policy and practice framed around the message: ‘Prepare. Act. Survive’. Bushfire safety policy now maintains that householders threatened by bushfire have two options: leave well in advance of the fire threat, or remain and defend a well-prepared property. However, policy strongly advocates early evacuation as the safest option, asserting that removing oneself from the bushfire risk is always safer than remaining. Ahead of days of ‘Extreme’ or ‘Catastrophic’ fire danger, emergency authorities advise that ‘leaving early may be the only safe action, even for people who are prepared to defend well prepared buildings’ [5] so property defence should not be contemplated (emphasis in original). Bushfire safety policy also promotes the development of a comprehensive bushfire plan, encouraging householders to decide well in advance, whether they will remain to defend property or evacuate. Waiting to see how a bushfire develops before making a decision is discouraged [6-8].

However, many householders to whom the policy is directed do not act in accordance with it [9]. Most householders do not remove themselves from areas of potential disaster risk on days of the highest bushfire danger, before a fire threatens [10, 11]. Systematic planning of property defence or evacuation is generally not undertaken [12]. Many do not evacuate well in advance of a bushfire, preferring to ‘wait and see’ how the bushfire situation develops [1, 3, 11, 13-15]. Many make limited property preparations, undertaking easy to do gardening and general maintenance [3, 15-17]. Some of those who plan to stay and defend are only partially committed and retain late evacuation as an option [3, 18] including the possibility of sheltering-in-place.

This failure to adopt the PAS policy may be because householders: recognise that they must ultimately make critical decisions about whether to remain and defend or evacuate in the face of a bushfire threat [6, 19, 20] that are based on their specific circumstances; and do not see the new policy as reflecting their experience and beliefs about bushfire. The previous PSDLE policy recognised the danger of radiant heat exposure but suggested that an adequately prepared dwelling was a safe refuge and highlighted the adverse effects of last minute evacuation through exposure or motor vehicle accident. It acknowledged that physically and emotionally capable householders who were appropriately equipped could defend their property from ember attack and save a building that could be otherwise destroyed [21]. The policy was supported both by academic research and reflected conventional wisdom ‘formalis(ing) an approach to bushfire safety long adopted by Australian residents, while emphasising the dangers of late evacuation’ [3].

The PSDLE provided a basis for householders to be able to choose their protective action. It justified their prerogative to choose between remaining and defending or evacuating from a bushfire threat. It created a sufficiently flexible decisional milieu in which people could legitimately consider a range of options reflecting their personal circumstances and their beliefs and values about bushfire. This was in contrast with the new PAS policy that primarily focused on staying to defend or evacuating, a binary decision. Householders could either evacuate early, preferably at a time and in manner advocated by the emergency authorities, or remain to defend their property. Once the decision was made, evacuees should leave and remain outside the threat area and the defenders should stay and defend.

Many householders respond to bushfire in ways that are inconsistent with the advice and warnings, firefighting strategies, and fire ground management of the emergency services [3, 13, 20]. Protective actions taken by householders during a bushfire do not simply involve a binary decision to stay and defend or to evacuate. Householders have been observed to evacuate at a time and in a manner determined by their unique circumstances and state of mind [20, 22, 23]. Some of those who decide to remain will end up leaving, while some of those who evacuate will return, even while the fire remains a threat [21]. Many households evacuate as a unit, while in others some members may evacuate, , leaving others to defend the property. Some householders who are committed to evacuating may be convinced to remain by a neighbour or relative or by the bushfire’s perceived failure to develop as a threat. Some evacuate but return believing the fire front has passed or that the bushfire would not approach their property. Others

wait to see how the fire develops and repeatedly delay their decision until the fire passes and a decision is unnecessary. Some others wait for direction from the emergency services [1, 3, 13, 19]. People may leave and re-enter affected areas at different times during and after a fire, in some cases avoiding road blocks and emergency services by using back roads, access through neighbouring properties and other means [24].

Some householders who remain and defend evacuate due to failure of equipment, loss of access to water, injury, or incapacity of the defenders. Emotional or psychological reactions to the threat, a reassessment of the severity or level of the threat or simply a change of mind about their willingness to fight the bushfire may also motivate evacuations [2, 3, 19]. Any remainder, depending on their circumstances, can decide to evacuate and in that sense all householders are potential self-evacuators.

This diversity of protective behaviour can be understood by partitioning the attitudes, beliefs and behaviours of this heterogeneous group into smaller homogenous sub-groups or archetypes that reflect systematic differences between householders and paint an authentic picture of evacuators and remainers. These differences point to potential levers for social policy interventions based on better understanding of how self-evacuator archetypes might respond to more targeted approaches or program interventions.

### **3. Archetypes**

The concept of an archetype was conceived by Carl Jung [25], in his work on the collective unconscious, as a typical character to whom an observer might emotionally resonate. The collective unconscious embraced impersonal, universally shared, fundamental characteristics of humanity that he referred to as primordial images or archetypes [26]. Archetypes are based on myths, legends and esoteric teachings and form part of the individual's unconscious mind. While Jung saw archetypes as universal across time and culture, others have relied on social cues replicated through dominant discourse [27] and collective memory, as shared experiences are constructed and validated through social interaction [28]. Archetypes in literature include The Hero, the Mother, The Mentor, The Scapegoat and The Villain, all of which have 'a universal acceptance, as readers identify the characters... in their social and cultural context' [29].



The formulation of *Australian archetypes* using cluster analysis in a large study by the Department of Families, Housing, Community Service and Indigenous Affairs established the concept as an important tool of public policy in Australia [30]. The study identified five archetypes within the Australian population based on sociodemographic, psychosocial and health characteristics. Reflecting the studies' aim to better understand the nature of the Department's stakeholders, archetypes were described as *Connected Retirees*, *Financially Secure Working Age Couples*, *Time-pressured Couples with Children*, *Dissatisfied Working Age Singles* and *Marginalised Australians*.

Archetypes have been discussed in the international wildfire literature based on local social context and community characteristics, that influence approaches to wildfire planning mitigation [31, 32] and in the development of fire-adapted communities [33]. The work of Paveglio et al [31] recognises the existence of diverse human populations living within the WUI and the impact of this diversity on how communities adapt to wildfire risk. A continuum of community archetypes is developed that describes a heuristic of shared characteristics and common strategies for enhancing wildfire adaptiveness. The four archetypes include the Formalised Suburban (FS) affluent, professional, highly defined, densely populated community, members often commuting to urban centres, and collective activity around clubs and common areas, is on one end of the continuum. They lack wildfire related skills and experience. The High Amenity/ High Resource (HAHR) community which is focused on amenity, lifestyle and recreation, embedded in outstanding landscapes and acting collectively on environment, has a greater heterogeneity of residents and wildfire related skills. The Rural Lifestyle (RL) community is based around rurality as a way of life and collective action is focused around the challenges and opportunities this entails. Members are more self-reliant and have a combination of professional and practical skills and experience relevant to wildfire. On the other end of the continuum, the Working Landscape/ Resource Dependent (WLRD) community is founded on rural livelihood pursuits and strong intergenerational and place-based ties with working on the land. Members have practical skills and are wildfire experienced. Collective action is community based and influenced by livelihood cooperation [33]. Carroll and Paveglio advance the view that that these archetypes point to the need for government wildfire programs to resonate with the reasons why people live where they do, if they are to engender community participation [33].

McLennan et al [20] examined psychological differences between intended evacuator and remainers resident in bushfire prone areas of south-eastern Australia that provided preliminary clues about the characteristics of self-evacuation archetypes. The study found that intended evacuees reported greater concern about bushfire danger, saw themselves and their property as vulnerable, and believed that others perceived leaving as the most desirable protective response. They were concerned their property was likely to be destroyed in their absence and that leaving would be inconvenient. Notwithstanding their strong intentions to leave, and concern for their homes, they were less likely to have an evacuation plan or to prepare their property to be left undefended. Intended remainers believed they were likely to successfully protect their valued property and saw themselves as well connected with other community members.

The *nous Group*, an international management consultancy business commissioned by the Fire Services Commissioner, undertook thematic analysis of 120 face-to-face interviews with residents in three bushfire-affected areas in Victoria identifying seven archetypal groups based on their perceptions of and responses to bushfire threat [34]. Archetypes were characterised by the way members typically understood bushfire risk, and their attitudes, intentions and priorities including self-efficacy and responsibility, bushfire experience, threat perception, preparedness, use of environmental and social cues, and networks, and intended protective response. The *nous* archetypal typology was based on the long-standing approach adopted by residents to 'stay and defend', 'wait and see' or 'evacuate when aware of a threat'. Consequently, three of the archetypes are based around property defence – the 'Can Do', the 'Considered' and the 'Livelihood' Defender, differentiated in large part by their motivation for remaining, their level of planning and preparation and their community connectedness. The 'Threat Monitor' does not intend to leave unless they come under what they perceive to be a serious bushfire threat. They remain and complete passive defensive preparations, extinguish embers, and protect pets and livestock. They often hope for a wind change to remove the threat or rely on access to escape routes if the threat becomes imminent. The Threat Avoider is highly aware of and feels vulnerable to the threat. They take responsibility for self-evacuating to protect their personal safety ahead of property protection, which is a lower priority. 'Unaware Reactors' believe they live in a safe area or that their property will not be threatened. Preparation and planning for bushfire is seen as unnecessary and information on the likelihood or existence of fire is not sought. A bushfire is likely to catch them unaware and incapable of an effective

response. The ‘Isolated and Vulnerable’ are limited in their ability to safely respond to bushfire because of physical or mental incapacity and social isolation from others who can help. They are unable to prepare their property and require advice and assistance from the emergency authorities if threatened by bushfire.

As will be seen later in the discussion, there are some limited similarities between the archetypes identified by the *nous Group* and those produced through this study. Such similarities may be inevitable given the focus of both on householder behaviour during bushfire and the factors that are well recognised in the literature as influencing such behaviour. *Nous’* archetypes were developed and described using a subjective, experience-based analysis of qualitatively generated data. In contrast, the seven archetypes presented in this paper were generated and confirmed using quantitative analysis, reducing the influence of subjective judgements on the number and character of the archetypal groups.. The archetypes presented in this paper elaborate, encompass and extend the ‘stay or go’ typology used to create the *nous* archetypes. Similarities between the archetypes developed by *nous* and in this study support both approaches.

## 4. Method

### 4.1. Participants

A total of 457 residents affected by a January 2014 bushfire in Parkerville, Stoneville and Mt Helena in the Perth Hills ( $n = 217$ ) and in thirteen towns and surrounding rural areas in the Adelaide Hills ( $n = 240$ ) in January 2015 were surveyed by telephone, achieving an overall response rate of 54.1% (cf. Table 1). There were 182 men (39.8%) and 275 women (60.2%) aged 18-44 (13.6%), 45-64 years (60.5%) and 65 and over (35.9%). Many (69%) lived in households without dependents while of those that did, 68.7% had dependent children and 31.3% housed dependent adults. 11.6% had a household member with a disability who required assistance or care. More than 80% had lived in the locality for over 10 years. 71% of respondents lived in homes within 100 metres of bushland and 21% lived between 100 and 500 metres of bushland. They described their property as a home on a residential block (29.8%), a small acreage (63.2%) or a large farm (7%). 71.5% owned their home outright, while 26.3% had a mortgage, 1.3% were renting and 0.9% had other arrangements.

Table 1: Response rate

	Parkerville, Stoneville, Mt Helena Bushfire (n=1000)	Sampson Flat Bushfire (n=917)
<i>Complete</i>	217	240
<i>Refused</i>	143	54
<i>Not qualified</i>	320	293
<i>Not contacted</i>	320	391
Response Rate	53.7%	54.5%

#### 4.2. Measures

A telephone survey was constructed to collect data from randomly selected residents living in areas that had been directly impacted by the bushfires. The Protective Action Decision Model (PADM) [35-40] provided a theoretical framework for the survey instrument. The PADM is a descriptive model whose foundations are in expectancy-valence theory, and recognises the effects of social and environmental contexts on decision-making and behaviour [37]. PADM explains and predicts protective action decisions taken by residents affected by hazard through an understanding of how beliefs and desires influence their protective actions and behaviour. The study collected data on residents':

- proximity to bushland;
- intended and actual responses to bushfire;
- self-efficacy and self-responsibility;
- experience of bushfire including property damage, injury, death or evacuation;
- intrusiveness<sup>1</sup> of the bushfire threat;
- threat perceptions (current and future) and perceptions of impact;
- perceptions of the attributes of hazard adjustments;
- long-run hazard adjustments undertaken;
- perceptions of stakeholders involved in the bushfire event;
- sources of information and warnings about the bushfire;

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<sup>1</sup> Intrusiveness refers to whether the householder thought about, discussed, saw in the media or read information about the threat of bushfire.

- protective action decision-making processes;
- impediments to evacuation and;
- demographics.

The survey also established householders' decisions to evacuate or remain during the event and the reasons for their actions. Details of the measures are in supplementary material available with this paper.

#### *4.3. Procedures*

Data were collected as part of PhD research on factors influencing householder self-evacuation in Australian bushfire. Participants were randomly selected from all households with a landline telephone located in the bushfire affected areas in the Perth and Adelaide Hills. The telephone survey in Perth was conducted between mid-March and mid-April 2014 commencing just over two months after the bushfire was extinguished. Data collection in the Adelaide Hills began approximately one month after the fire, in early February and concluded in late March 2015. To ensure consistency of questioning and approach the lead author personally completed all 457 telephone interviews.

#### *4.4. Data analysis*

Householders were questioned about factors identified within the PADM and detailed as measures in the supplementary material as central to protective action decision-making. These factors included intrusiveness of threat; perceived imminence, extent and impact of threat; self-efficacy and responsibility; short-run hazard adjustment perceptions; stakeholder perceptions; and bushfire experience. Scores from continuous variables were converted to Z scores and analysed using the K-means cluster procedure of IBM SPSS 24 [41] which analyses distances between cases to identify groupings of those cases [42]. To identify the most appropriate number of clusters, the K-means analysis was run for 3, 4, 5, 6, 7 and 8 clusters. Seven clusters provided the greatest level of stability to the analysis. Convergence was reached in 13 iterations. Final cluster centres were generated and univariate ANOVAs indicated that the clustered groups differed significantly ( $p < .05$ ) on all except four variables. The number of cases in each cluster ranged from 31 to 93, representing a broad, but acceptable, range.

The groups of householders identified through the cluster analysis were subject to an explanatory discriminant function analysis [42] to demonstrate the statistical validity of the clusters. A set of weighted linear combinations of the quantitative variables that best differentiated the householder groups was generated. The discriminant functions that resulted in combination accounted for a statistically significant percentage of the between-group differences. 93.4% of original grouped cases were correctly classified and using a leave-one-out cross-validation strategy, 79.0% of the cases were correctly classified. All six functions were statistically significant although only the first three generated eigenvalues greater than 1. A multiple comparison test of the variables describing the clusters was undertaken to draw out similarities and differences between them. Crosstabulation of the clusters by categorical variables further characterised them. Details of these procedures are included as supplementary material.

## 5. Results

The seven self-evacuation archetypes are summarised in Table 2. They characterise the diverse attitudes and behaviours of typical groupings of householders faced with making a protective decision during a bushfire. The archetypes do not attempt to reveal the behaviour or circumstances of individuals but represent typical groupings. Consequently, a range of individuals and circumstances may be reflected in a single archetype. For example, a householder may deny that they are threatened because they believe vegetation surrounding their property would not carry a fire to it, while another may believe that their house could withstand a fire due to its construction e.g. brick or stone.

Table 2: Description of Archetypes

Archetype	Key characteristics	Evacuate or Remain
Responsibility Denier	Believe they are not responsible for their personal safety or for their property	Highly committed evacuators but expect others to direct and assist
Dependent Evacuator	Expect the emergency services to protect them and their property because they are incapable of taking responsibility for themselves	
Considered Evacuator	Having carefully considered evacuation, are committed to it as soon as they are aware of a bushfire threat	Committed to self-directed evacuation
Community Guided	Seek guidance from neighbours, media and members of the community who they see as knowledgeable, well informed and providing reliable advice	Committed to evacuation on community advice

Worried Waverer	Prepare and equip their property and train to defend it but worry they lack practical experience to fight bushfire putting their personal safety at risk	Wavering between evacuating and remaining
Threat Denier	Do not believe that their personal safety or property is threatened by bushfire	Committed to remain as perceived lack of threat makes evacuation unnecessary
Experienced Independent	Are highly knowledge, competent and experienced and are responsible and self-reliant fighting bushfire	Highly committed to remaining because they are highly experienced and well prepared

### 5.1. Characteristics of archetypes

#### 5.1.1. Threat Denier (13.6%)

Threat Deniers did not believe that their personal safety or property was threatened, nor would it be by a bushfire in the future. Bushfire would not impact their personal safety, home, property, livestock, or pets. They did not allow bushfire threat to intrude on their thoughts, in conversations with neighbours, in their media use or in their reading. They were committed to remain, believing that a fire was not a threat, that remaining was the best way to protect their personal safety, and required little knowledge or skill, time and effort or cooperation from others. Threat Deniers had little or no bushfire experience but some limited training from experienced people. They did not prepare their home, have firefighting equipment or protective clothing and did not prepare for quick evacuation.

#### 5.1.2. Responsibility Denier (10.3%)

Responsibility Deniers believed that they were not responsible for their personal safety or property protection. They felt no need to be self-reliant. Bushfire threat did not intrude into their lives in any way. During the bushfire, they did not seek information or carefully consider information they received. Evacuating was viewed as the best way to protect their personal safety but required knowledge and skills. Remaining was best for property protection but involved expense. Neither the emergency services nor the media influenced their decision making but they expected the emergency services to protect them. They had little knowledge

of bushfire, experience with bushfire, or training. They had not prepared their property against bushfires, did not have firefighting equipment, or have protective clothing.

#### 5.1.3. Experienced Independent (20.3%)

Experienced Independents were experienced with bushfire through firefighting or training. Some were current or past volunteer brigade members. They believed they had extensive knowledge of bushfire, exceeding that of other stakeholders. They perceived a high degree of bushfire threat to their property but not to personal safety. They prized self-reliance and saw personal safety and property protection as their responsibility rather than the emergency services'. Remaining was viewed as best for personal safety and property protection. They strategically prepared their property by undertaking activities such as removing vegetation, covering gaps to block embers, and moving combustible materials. They had firefighting equipment, protective clothing, filled their gutters with water and wet around their house. Neighbours, the media, and the emergency services were not believed to be as knowledgeable about bushfire or as well informed about what was happening as they were. Both the media and the emergency services were not seen to provide useful information and advice about the bushfire and did not influence their decisions.

#### 5.1.4. Community Guided (18.4%)

Community Guided were characterised by their positive perceptions of the knowledge and expertise of their neighbours, the media and the emergency services and the guidance that they took from them. Other stakeholders were viewed as knowledgeable, well informed about what was occurring and provided valuable information and advice. Both the media and the emergency services were influential in their decisions. The threat of bushfire did not intrude into their thoughts, discussions or media use. They did not believe that they needed to be self-reliant or accept responsibility for themselves or their property. They had little direct experience with bushfire or bushfire fighting but some bushfire training. They made some preparations such as covering gaps against embers and watering around their house to maximize its survivability in their absence. They had hoses, buckets and mops to extinguish spot fires. They were concerned about threat to their personal safety and believed that evacuating was the best way to protect it. Community Guided felt well informed about what



was happening during the bushfire because of the information, clarification and advice provided by other stakeholders.

#### 5.1.5. Worried Waverer (13.3%)

Worried Waverers were characterised by: concern about the threat and likely impact on their personal safety and property; their broad-based efforts to address this threat; and concern their lack of bushfire experience put them at risk if they remained. Bushfire threat was part of their discussions with neighbours and their reading. Evacuating was seen as the best way to protect personal safety. They felt knowledgeable about bushfire, well informed about what was happening and had planned how they would respond. The media was seen as well informed and providing influential information. Few had experience fighting bushfire but current or past involvement in volunteer fire brigades and bushfire training, although limited, increased their confidence. They prepared their property by cleaning gutters, moving combustible material and watering around their house. They had firefighting equipment and personal protective clothing. A vehicle was often positioned for a quick exit. Worried Waverers were bushfire aware, had trained for and prepared their property for bushfire and did not want to simply evacuate in the face of the threat but recognized that they were inexperienced and were worried that remaining would threaten their personal safety.

#### 5.1.6. Dependent Evacuator (6.8%)

Dependent Evacuators expected the emergency services would take responsibility for protecting their personal safety and property. They did not perceive a current or future personal or property threat because they intended to evacuate with the help of the emergency services who extensively influenced their decisions. The threat of bushfire had therefore not intruded on their lives in any way. They felt they lacked knowledge of and information about the bushfire, were unable to decide what they should do and were incapable of taking responsibility for themselves. They had no personal experience fighting bushfire and no training but some had previously evacuated from a bushfire. Their property was unprepared and unprotected. They had no firefighting equipment or personal protective clothing. They were committed to evacuating as both the best way to protect their personal safety and their property, believing that once they left the fire services would defend their home.

#### 5.1.7. Considered Evacuator (17.3%)

Bushfire threat intruded extensively into the lives of Considered Evacuators. It was a current and future threat that was perceived as likely to damage or destroy their home and property. They had no personal experience fighting bushfire although some had evacuated in the past and some had limited training. They attempted to protect their property in their absence by undertaking activities such as covering gaps and vents against embers, but were not equipped to fight fire or extinguish spot fires and lacked protective clothing. They were strongly committed to evacuating as the best way to protect their personal safety as soon as they became aware of the potential threat.

### 5.2. *Comparison of archetypes*

The protective behaviours of the seven archetypes are influenced by a complexity of attitudes, values and beliefs. Consequently, comparison of the archetypes is challenging, as reflected in Table 3 and the discussion that follows. Similarities and differences in the archetypes illustrated in Table 3 are based on a multiple comparison test of the variables describing the archetypes. The Tukey test for pairwise comparisons was used to compare each archetype with every other archetype (family-wise comparison), for each variable, using the standard error of the mean and Studentized Range distribution. The overall (family-wise) error rate was controlled at the rate for the entire set of all pairwise comparison [42]. Table 3 offers a simple *yes or no* representation of the similarities and differences between the archetypes.

#### 5.2.1. Perception of threat and responsibility

Experienced Independents and Worried Waverers perceived a major threat and impact to personal safety and property because they intended to remain, while Considered Evacuators discounted the threat to personal safety, but not property, because they intended to leave. Threat Deniers, Responsibility Deniers and Community Guided discounted the threat to personal safety because they believed there was no threat, others would take responsibility for them and working with others would protect them, respectively. Responsibility Deniers, Threat Deniers, Dependent Evacuators, and Community Guided did not believe they needed to be self-

Table 3: Similarities and differences between archetypes

Factors	Archetypes						
	<u>TD</u>	<u>DE</u>	<u>CG</u>	<u>RD</u>	<u>WW</u>	<u>CE</u>	<u>EI</u>
<b>Intend to evacuate</b>	N	Y	Y	Y	Y	Y	N
<b>Experienced bushfire</b>	N	N	N	N	N	Y	Y
<b>Thought about bushfire threat</b>	N	N	N	N	Y	Y	Y
<b>Need to be self-reliant/ accept responsibility</b>	N	N	N	N	Y	Y	Y
<b>Bushfire Threat</b> Threat/impact to personal safety/ property Cause death or injury Damage/ destroy house/ property	N	N	N	N <sup>TI</sup>	Y	Y <sup>DI</sup>	Y
<b>Evacuation best way to protect personal safety</b>	N	Y	Y	Y	Y	Y	N
<b>Evacuation best way to protect property</b>	N	Y	Y	N	Y	Y	N
<b>Remaining best way to protect personal safety</b>	Y	N	N	N	N	N	N
<b>Remaining best way to protect property</b>	N	N	N	Y	N	N	Y
<b>Need knowledge / skill to evacuate</b>	N	N	Y	Y	Y	Y	N
<b>Need knowledge / skill to remain</b>	N	N	N	Y	N	Y	Y
<b>Householder</b> Influence decisions Knowledgeable Well informed (TD1) (EI2) Responsible for protecting	N	N	Y	N	Y	N	Y
<b>Neighbours</b> Knowledgeable Well informed Provide accurate information	N	N	Y	N	Y	N	N
<b>Media</b> Influence decisions Knowledgeable Well informed Provide accurate information Responsible for protecting	N	N <sup>ID</sup>	Y	N <sup>K</sup>	Y	Y	N
<b>Emergency Services:</b> Influence decisions Knowledgeable Well informed Provide accurate information Responsible for protecting	Y <sup>NI</sup>	Y	Y	N <sup>WI</sup>	Y	N <sup>ID</sup>	N
	Y	Y	N	Y	N	Y	N
Superscripts denote exceptions: TI-perceived potential threat/impact. DI-not perceive potential death/injury. ID-influenced decision. K-perceived as knowledgeable. NI-did not influence decision. WI-perceived as well informed.							

reliant in a bushfire or to take responsibility for their home and property either because a bushfire was not a threat, others would take responsibility, or in the case of Community Guided, members of the community would help each other. Experienced Independents, Worried Waverers, Considered Evacuators and Community Guided did not believe the emergency

services were responsible for protecting them or their property because they were self-reliant or intended to cooperate with the community. While Threat Deniers believed they didn't need protection from a threat that didn't exist, if there was one they expected the emergency services to protect their home.

#### 5.2.2. Thinking about threat (intrusiveness)

Responsibility Deniers, Threat Deniers, Dependent Evacuators and Community Guided did not think about bushfire threat because either the threat did not exist or they expected that others would deal with it for or with them. Worried Waverers, Experienced Independents and Considered Evacuators had the threat of bushfire intrude extensively on their daily lives.

#### 5.2.3. Perception of stakeholders

Community Guided and Worried Waverers perceived the media as influential and having a responsibility for protecting them by providing reliable information. The emergency services also influenced them. Experienced Independents viewed the capabilities, influence and responsibility of other stakeholders as very limited. Threat Deniers and Responsibility Deniers believed that the media and the emergency services were responsible for protecting them. Responsibility Deniers believed the media had specialist bushfire knowledge, while Threat Deniers thought emergency services did. Dependent Evacuators were dependent on the emergency services' knowledge and advice expecting them to take responsibility for them. Considered Evacuators were influenced by the media which they saw as knowledgeable, well informed and providing reliable advice, and by the emergency services who they expected to take responsibility for their safety. Responsibility Deniers, Dependent Evacuators, and Considered Evacuators felt they lacked knowledge and information about bushfire. Responsibility Deniers and Dependent Evacuators felt that they were not responsible for protecting themselves. On the other hand, Experienced Independents, Community Guided and Worried Waverers saw themselves as bushfire capable and responsible although Experienced Independents, did not feel sufficiently well informed about the bushfire, probably because they had high information standards. Threat Deniers thought they were well informed and responsible for themselves because they perceived no threat and had nothing to take

responsibility for. They ignored inputs from family who they saw as lacking bushfire knowledge and incapable of understanding that it did not pose a threat.

#### 5.2.4. Hazard adjustment perceptions

##### 5.2.4.1. Effectiveness of evacuating or remaining

Community Guided, Worried Waverers, Dependent Evacuators, and Considered Evacuators believed that evacuating was best for personal safety and property protection and remaining the opposite because they were inadequately prepared. Experienced Independents saw remaining as the best way to protect personal safety and property because they had prepared a defensible and safe environment. Responsibility Deniers saw evacuating as best for personal safety but not for property protection and remaining as the opposite. Threat Deniers saw evacuating as bad for both personal safety or property protection because if there was no threat, there was no need to evacuate. So, remaining was the best option for personal safety by avoiding other areas that might be threatened by fire. On the other hand, if a threat became imminent, remaining was not the best for property protection because they were unprepared and inexperienced and they expected the emergency services to protect their property if they evacuated.

##### 5.2.4.2. Knowledge and skill

Community Guided, Worried Waverers, and Dependent Evacuators believed that they did not need knowledge or skill to remain because they would rely on the advice and support of other stakeholders, while Threat Deniers did not need skills to deal with a threat that they believed didn't exist. Considered Evacuators, Experienced Independents and Responsibility Deniers believed that knowledge and skills were needed to address a bushfire threat. Responsibility Deniers expected others to use their skills to protect them, Considered Evacuators intended to apply their skills to evacuating and Experienced Independents believed they had the skills necessary to defend their property.

#### 5.2.5. Preference for evacuating or remaining

Responsibility Deniers and Dependent Evacuators were the most committed to evacuating, due to their unpreparedness and lack of experience of bushfire. Community Guided and Considered Evacuators were also committed to evacuating because of the risk to their personal safety and the advice of others. Worried Waverers were the least committed to evacuating because they had considered the threat, taken responsibility and prepared and equipped themselves, but were worried that they lacked experience of fighting bushfire. Experienced Independents were the most committed to remaining because they felt highly experienced and well prepared while Threat Deniers were very committed because they did not believe there was a threat from which to evacuate.

## **6. Discussion**

A bushfire event confronts householders with a complex, intense and unfamiliar setting in which they must make critical decisions for themselves and often for loved ones. They must negotiate various decisional routes, each involving different actions and risks, to reach a protective response decision. Self-evacuation archetypes discussed in this paper characterise the understanding and responses of groups of typical householders to a bushfire threat.

The archetypal groupings encompass their members' distinctive values, beliefs and attitudes reflecting a diversity of personal and social factors that influence a complex process of assessment and appraisal of bushfire threat and response. Bushfire safety education and engagement activities must challenge householders' perceptions of and relationship with risk to encourage a re-evaluation of their beliefs and attitudes that are central to their protective action decision-making [16]. Bushfire safety education practitioners have proposed that community engagement programs should encourage householders to reflect on, discuss and review their protective action judgements, intentions and choices in collaboration with community members and the emergency services, to build shared understandings, respect and trust and confidence in their own capacity to successfully respond to bushfire threat [16, 43]. If bushfire education programs are to effectively influence householders' behaviour 'they must lead to the re-assessment of a person's existing perspective by using varied strategies that target particular factors influencing decisions' [16]. Bushfire education and engagement programs can more effectively realize community safety objectives by targeting programs and activities

to meet the specific needs of householders within these archetypal groups. Fire agencies can assemble information about at-risk households to target programs based on these archetypes through a range of sources including telephone, social media or on-line surveys. The following section discusses how, by reflecting the unique characteristics of the archetypes, programs can be fashioned to improve community bushfire safety to enhance threat awareness, promote self-responsibility, strengthen community cooperation and promote better resource utilisation.

### *6.1. Engaging Threat Deniers*

It is irrational for someone who does not believe that a bushfire threat exists (Threat Denier) to prepare their property or themselves, to compose a bushfire plan, or contemplate evacuating. They are likely to be confident of their threat assessment and may misjudge the potential risk and the need for planning. When a bushfire occurs, they are unlikely to engage until the threat becomes imminent, in which case they are likely unprepared, ill-equipped and have inadequately considered the need to defend or evacuate. Threat Deniers are likely to delay protective responses and may evacuate dangerously late. Threat Deniers include those identified in the literature as failing to recognise they are at risk [3, 13, 44, 45].

Passive communications strategies that rely on the Threat Denier's active involvement are unlikely to be effective. Rejection of the need for planning and preparation means the Threat Denier is not thinking about bushfire, is unlikely to be involved in bushfire-related neighbourhood activities or to consider government communications about bushfire. Threat Deniers believe that the emergency services have knowledge of bushfire behaviour in general but do not understand their specific circumstances and risk as well as they do. An active bushfire safety program that identifies and targets the Threat Denier and clearly demonstrates the basis of and extent of the bushfire threat to their property is required. McLennan *et al.* (2016) highlight the potential for bushfire-related programs and information to be provided through existing community organisations that Threat Deniers may be involved with. They provide the example of 'Be Ready Warrandyte', a 3-year bushfire preparedness project led by the Warrandyte Community Association with the support of Victoria's Country Fire Authority (CFA) and State and local government. The project raised awareness of bushfire risk within the Warrandyte community and encouraged residents to develop a bushfire plan. Similarly, Haworth *et al.* (2016) point to participatory mapping at the community scale as a means for

enhancing local understandings of bushfire risk and increasing engagement in risk reduction. Bushfire simulation and virtual reality can realistically depict the actual threat to personal safety and property that is being rejected by the Threat Denier.

### *6.2. Confirming the responsibilities of Responsibility Deniers*

Responsibility Deniers accept the existence of bushfire threat but reject responsibility for protecting themselves or their property and feel incapable and unprepared. They expect the emergency authorities to make decisions for them, to evacuate them if necessary and to fight the bushfire to protect their property, like the approach taken by North American emergency authorities. These individuals are in part represented in the literature as those who believe it is not their responsibility to prepare [44] or wait to be told what to do by the authorities [1].

Engagement programs are required to clarify the specific role of the emergency services, demonstrate how the Responsibility Denier can take effective protective action and to graphically explicate the implications of not accepting the need to assume an appropriate level of responsibility for their personal safety during a bushfire.

### *6.3. Identifying and supporting Dependent Evacuators*

Dependent Evacuators are committed to evacuating to protect their personal safety during bushfire but believe they are incapable of doing so without assistance. They need the advice and assistance of emergency services [46], relatives or friends to evacuate [13, 18]. Many expect the emergency services to step in and defend their property after they evacuate, expressing this as ‘getting out of the firefighter’s way so they can do their job’. The aged and disabled are representative of this archetype but also includes individuals who are vulnerable due to lack of transport, responsible for the care of young children, separated from partners or lack English language skills.

A broader definition of dependence and vulnerability is needed, that builds on existing insights [47, 48]. Programs for the aged, disabled and vulnerable require strengthening including extending limited existing databases, coordinating local government services, developing



comprehensive logistical evacuation plans and identifying in advance and addressing special needs during an emergency [49]. Assistance for Dependent Evacuators to assess their strengths, weaknesses and needs during an emergency, and building on their limited capabilities could better target limited emergency services resources.

#### *6.4. Building on Community Guided networks*

Community Guided are well connected within their neighbourhood or local community, access information and advice through that network and the media, develop a collective view of the situation [50] and spread the burden of bushfire threat and responsibility [51]. They have confidence in, listen to and rely on influential and trusted people and organisations in their community. Some Community Guided are dependent on this advice and assistance and expect that others will assist them [44]. They share the responsibility for deciding whether to remain or to evacuate and are reassured in the correctness of their choices through this sharing. Decisions are based on the knowledge that they are part of a ‘way of life’ in a community that will assist one another to implement them [44, 52, 53]. Access to high quality information from their neighbours and through monitoring media and emergency services communications is essential to their protective decision-making. They are likely to be involved in community and neighbourhood bushfire education and engagement programs. Maintaining their involvement and continually improving and renewing the community engagement programs and systems is highly desirable [54] and a continuing challenge for the emergency services. The existence of this archetype reinforces the importance of neighbourhood/ community based bushfire education and engagement programs in both supporting and harnessing existing community capacity, resources and action [55, 56].

#### *6.5. Facilitating Considered Evacuators*

The threat of bushfire and its likely impact on their personal safety is foremost in the minds of Considered Evacuators. They think about, plan and prepare for the possibility of a bushfire. They are committed to evacuating ahead of the threat because they feel responsible and self-reliant but know they lack bushfire defence capability and experience and have made limited property preparations. They understand that by evacuating they put their property at risk but accept this as the cost of protecting their personal safety. They take responsibility for their

neighbours and expect them to reciprocate. Considered Evacuators respect and respond to information and advice from media and emergency services. As soon as they assess the immediacy of the bushfire threat they organise themselves and leave [57]. Especially for longer duration fires, householders have more time to consider their options and prepare [18] and leave well in advance of the bushfire.

Considered Evacuators require timely, detailed, and accurate information and advice during a bushfire to identify the threat and make informed decisions on their evacuation. Since they are committed to evacuating, bushfire education programs can be pared-down to the essentials which would include: preparing an evacuation plan; identifying and accessing sources of information on bushfire status and road closures; and establishing a clear evacuation trigger. Detailed information that promotes early evacuation or supports other options such as: property preparation including vegetation management and landscaping; property defence including purchasing, installing and maintaining firefighting equipment; and a detailed bushfire plan is unnecessary.

#### *6.6. Empowering Worried Waverers*

Worried Waverers fear potential injury or death if they remain, and the destruction of their property if they leave. They see evacuating as the best option but don't want to leave unless absolutely necessary. Their awareness of the bushfire threat, combined with a belief they should be self-reliant and responsible motivates their considerable efforts to organise against bushfire by planning, maintaining and preparing their home and property, and equipping it for bushfire defence, although this may simply amount to combatting minor ember attacks [57]. During bushfire, they carefully monitor the media, analysing information in detail. They want to defend their property, have the training and equipment, but are uneasy that their information is out-to-date, inaccurate, and unreliable and worry about their lack of firefighting experience. They are not self-assured and independent and want neighbours to advise and help them out if necessary. Wavering between remaining and evacuating places them in danger of attempting to defend against an extremely severe bushfire or deciding to evacuate at the last minute.

Practical, intensive bushfire safety education programs during the bushfire season are necessary to raise the experience and skills of Worried Waverers' to a higher level and increase

their confidence in making appropriate decisions during a bushfire. Worried Waverers' uncertainty about their capability to successfully defend and their commitment to being well prepared for fire suggests that programs promoting property survival in their absence may be effective.

#### *6.7. Harnessing the capabilities of Experienced Independents*

Experienced Independents have considerable knowledge and experience of bushfire, many as members of volunteer brigades, and are committed to the defence of their property [9, 57]. They are conscious of the bushfire threat to household members and their property but confident of minimizing it. They are self-reliant, responsible, and independent-minded. They believe that their extensive efforts to maintain their property, remove vegetation and to secure structures, and installing and deploying equipment and water sources for property defence ensures their safety and success without assistance from the authorities [20]. They use their own information sources and those of close neighbours or friends and trust the evidence of their own eyes. Self-efficacy acts to reduce intentions to seek information [58] but they want information they receive to be accurate, detailed, and live, to enable effective defence.

Programs to improve quality and timeliness of information, including continuing access to scanner and live radio communication, and investigating innovative means of information provision, such as via readily accessible, live online maps [57, 59], would reinforce Experienced Independent's protective efforts. Local emergency service leadership should consider if and how Experienced Independents' expertise and knowledge could be harnessed to the benefit of the wider community including acting as a resource for neighbourhood bushfire groups and community support networks and providing training and mentoring to householders who want to defend their property but lack experience as typified by Worried Waverers.

## **7. Conclusions**

Householders' protective responses to a bushfire threat are diverse. While fire and emergency services tend to consider householders as evacuees or remainers, there is in fact considerable variety in the way they respond to bushfire. The observation that "the binary approach to

‘Prepare, stay and defend or leave early’ does not adequately reflect the reality of what people do during bushfires...” [3] is a clear statement of the central tenet of this paper. The emergency services’ community bushfire-safety policy presents essentially a binary choice to householders, to stay or to go. This paper provides insights into the diverse and complex ways householders respond to bushfire threat and the factors that influence responses.

Archetypes are an important tool of Australian public policy [30] and are useful in understanding the similarities and differences between how householders living in bushfire prone areas perceive and respond to bushfire threat. This study identified seven archetypes based on their attitudes toward and response to bushfire threat.. There are significant consistencies between these archetypes and those identified in other studies [31, 33, 34] that warrants further investigation including whether the four community archetypes [33] might be considered as representing different concentrations of individual archetypes influencing norms within particular communities.

By revealing the diversity and complexity of householders’ self-evacuation responses, this paper suggests that bushfire safety programs, designed around limited protective action stereotypes inadequately address the fundamental issues that shape householders’ protective action decisions during a bushfire.

Bushfire programs require review to increase levels of active and effective householder management of bushfire risk by reflecting the everyday realities faced by remainers and evacuator [20]. To achieve this emergency agencies need to identify individuals who display these archetypal characteristics and design and target bushfire safety programs to embrace the diversity of householders, the circumstances they confront during a bushfire and the fundamentally different decisional paths that they take to a protective response [60].

The insights gained through the archetypes developed in this study provide a basis for the emergency authorities to productively interpret and respond to householders’ during a bushfire in a manner that is tailored to their archetypal characteristics. The central characteristics of the archetypes suggest features of bushfire safety programs that would more effectively promote community safety. Assessment of householders living in bushfire prone areas, based on these archetypes can facilitate the delivery of more targeted and effective

community safety programs. Australian emergency authorities have recognised that a major challenge in reaching diverse at-risk groups is identifying them ‘and how they might best be approached and influenced to behave safely’ [61]. This discussion of self-evacuation archetypes goes some way in establishing the characteristics of at risk groups and appropriate means of approaching and influencing them.

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